REMARKS

Claims 1-50 are pending in the application. Claims 4, 8 and 50 have been amended. No new matter has been added. Reconsideration of the claims is respectfully requested.

Rejections under 35 U.S.C. § 102

Claims 1-4, 8, 16 and 18-50 are rejected under 35 U.S.C. § 102(e) as being anticipated by Vilhelmsson et al. (U.S. Publication No. 2002/0181519) (Vilhelmsson). It is stated that Vilhelmsson discloses a laser system comprising a laser (102) producing a beam of output light, a detector unit (128,132) and a fringe producing optical element disposed in the beam of output light to direct a portion of the beam of output light to the detector unit.

Independent claim 1 is directed to a laser system that comprises a laser producing a beam of output light and a detector unit. A fringe-producing optical element is disposed in the beam of output light to direct a portion of the beam of output light to the detector unit as a second light beam. An interference pattern is produced in the second light beam by the fringe-producing optical element.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Therefore, all claim elements, and their limitations, must be found in the prior art reference to maintain a rejection based on 35 U.S.C. §102. Applicants respectfully submit that Vilhelmsson does not teach every element of the rejected claims, and therefore fails to anticipate the claims.

In claim 1, the fringe-producing element is disposed in the output beam produced by the laser. Vilhelmsson, in contrast, teaches a laser (102) that produces an output beam (106) that is intercepted by a beamsplitter (110). The beamsplitter splits off a portion of the incident light as the probe beam (120). The output beam itself is directed

to an optical fiber. It is the probe beam that is incident on the non-parallel etalon (112), and not the output beam. Accordingly, Vilhelmsson does not teach that the fringe-producing element is disposed in the output beam, but that the beamsplitter is disposed in the output beam. Vilhelmsson's fringe-producing element, the non-parallel etalon, is disposed in the probe beam that is generated by the beamsplitter.

Independent claim 22 is directed to an optical communications system having, *inter alia*, one or more laser units producing a laser output beam and having a wavelength stabilizing unit. The wavelength stabilizing unit includes a detector unit and a fringe -producing optical element disposed in the laser output beam to direct a portion of the laser output beam to the detector unit as a second light beam. The fringe-producing optical element causes an interference pattern in the second light beam. A control unit is coupled to receive detection signals from the detector unit and is adapted to generate a laser frequency control signal for controlling wavelength of the at least one of the one or more laser units.

As has been discussed above with regard to claim 1, Vilhelmsson does not teach a fringe-producing element in the output beam produced by a laser, but places a beamsplitter in the output beam from the laser to direct a probe beam to the non-parallel etalon. Accordingly, Vilhelmsson fails to teach all the elements of claim 22, and claim 22 is not anticipated by Vilhelmsson.

Independent claim 26 is directed to a method of stabilizing an operating frequency of an output light beam produced by a laser. The method includes deflecting a portion of the output light beam as a second light beam using a fringe-producing optical element. The fringe-producing optical element causes an interference fringe pattern in the second light beam. Portions of the interference fringe pattern are detected using a detector unit. Detector signals are produced in response to the detected portions of the interference fringe pattern. A frequency control signal is generated in response to the detector signals and the laser is tuned in response to the frequency control signal so that the operating frequency of the output light beam is substantially at a desired value.

Independent claim 43 is directed to a method of stabilizing the operating frequency of an output light beam produced by a laser. The method comprises deflecting a portion of the output light beam as a second light beam using a fringe-

producing optical element. The fringe-producing optical element causes an interference fringe pattern in the second light beam. The operating frequency of the output light beam is stabilized using the interference fringe pattern.

According to these claims, a portion of the output beam of the laser is deflected by a fringe-producing optical element as a second beam having an interference pattern. Vilhelmsson fails to teach such a method. Instead, Vilhelmsson teaches deflecting a portion of the output beam from the laser towards the fringe-producing element using a beamsplitter.

Accordingly, since Vilhelmsson fails to show all the elements of claims 26 and 43, claims 26 and 43 are not anticipated by Vilhelmsson, and are allowable.

Independent claim 50 is directed to a system for stabilizing the operating frequency of an output light beam produced by a laser. The system comprises a laser producing an output light beam, and deflecting means for deflecting a portion of the output light beam as a second light beam. The deflecting means produces an interference fringe pattern in the second light beam. The system also includes means for stabilizing the operating frequency of the output light beam using the interference fringe pattern.

Vilhelmsson does not teach any laser system in which a deflecting means is disposed in the laser's output beam to produce a second beam having an interference pattern. Instead, Vilhelmsson's system uses a beamsplitter in the laser's output beam to direct light to the non-parallel etalon. The non-parallel etalon produces the interference pattern.

Since Vilhelmsson fails to teach all the elements of claim 50, claim 50 is not anticipated by the prior art and is allowable.

Dependent claims 2-4, 8, 16, 18-21, 23-25, 27-42 and 44-49, which are dependent from independent claims 1, 22, 26, and 43, were also rejected under 35 U.S.C. §102(e) as being unpatentable over Vilhelmsson. While Applicants do not acquiesce with the particular rejections to these dependent claims, it is believed that these rejections are moot in view of the remarks made in connection with independent claims 1, 22, 26 and 43. These dependent claims include all of the limitations of the base claim and any intervening claims, and recite additional features which further

distinguish these claims from the cited references. Therefore, dependent claims 2-4, 8, 16, 18-21, 23-25, 27-42 and 44-49 are also in condition for allowance.

Claims 1-4, 8, 16, 19-21 and 26-50 are rejected under 35 U.S.C. § 102(b) as being anticipated by Jenkins et al. (U.S. Patent No. 5,917,596). Jenkins discloses a system for analyzing the radiation field of radiation using a technique that includes interference patterns. The technique is used for analyzing the radiation field of CO_2 laser light reflected from a scene. The system includes a CO_2 laser (34) that sends light into an input waveguide (14). A beamsplitter (38) at the end of the input waveguide directs about one half of the radiation along a conversion waveguide (16) to a tunable mode converter (28). The other half of the radiation passes along a transmit/receive waveguide (18), and is transmitted into free space via a lens system (31).

The radiation analyzer works as follows. Light reflected from the scene is passed back into the transmit receive waveguide, and is combined with the light returning from the mode converter. The combined light is passed to a detector system 36. As the mode converter changes the returning light amongst different modes, the interference between the returned light and the reflected light changes. A knowledge of the modes of the returned light, and the interference signals permits the determination of the spatial mode of the light reflected from the scene.

The system taught by Jenkins is very different from that of the invention. For example, with regard to claim 1, Jenkins does not teach that fringe-producing optical element is disposed in the output beam from the laser. Jenkins only teaches that a beamsplitter is disposed in the beam of radiation from the laser. A beamsplitter does not produce the interference pattern claimed here, and is not a fringe-producing element. The interference pattern discussed by Jenkins is produced by a combination of the mode converter and the scene, which each direct light in a particular mode to the beamsplitter. Accordingly, it is a combination of all three elements, the beamsplitter, the scene and the mode converter that produce the interference pattern. The scene and the mode converter are not located in the output beam from the laser. Remove either of the these two elements, and the beamsplitter, the only element sitting in the radiation beam from the laser, does not produce the interference pattern.

It can, therefore, be seen that the beamsplitter is not a fringe-producing element, and the combination of the beamsplitter, the scene and the mode converter together cannot reasonably be considered to be the fringe-producing element disposed in the output beam of the laser.

Accordingly, Jenkins fails to teach all the elements of independent claim 1, and is not anticipated by claim 1.

Likewise with independent claims 26, 43 and 50, each of these claims includes a fringe-producing element, or a deflecting means that produces an interference pattern. Jenkins fails to teach all the elements of these other independent claims, and they are not anticipated.

Furthermore, with regard to claims 26 and 43, these claims are directed to method of stabilizing the operating frequency of a laser. Jenkins has nothing to do with stabilizing the operating the frequency of a laser. Instead, Jenkins teaches finding the mode of light reflected from a scene based on the interference between that reflected light and the light from a mode converter. This has to do with the spatial mode, and is not concerned with the laser frequency. In addition, there is no mechanism provided to control the laser based on the interference pattern. Jenkins is inapplicable as a reference for frequency stabilization.

Dependent claims 2-4, 8, 16, 19-21, 27-42 and 44-49, which are dependent from independent claims 1, 26, and 43, were also rejected under 35 U.S.C. §102(b) as being unpatentable over Jenkins. While Applicants do not acquiesce with the particular rejections to these dependent claims, it is believed that these rejections are moot in view of the remarks made in connection with independent claims 1, 26 and 43. These dependent claims include all of the limitations of the base claim and any intervening claims, and recite additional features which further distinguish these claims from the cited references. Therefore, dependent claims 2-4, 8, 16, 19-21, 27-42 and 44-49 are also in condition for allowance.

Regarding claim 19, Jenkins is silent as to using the interference pattern to stabilize output power from the laser. The Office Action points out FIG. 14 and col. 21, lines 41-57. This describes, however, a system similar to that discussed above with regard to Jenkins's FIG. 1, and is used only for measuring the mode of light reflected

from a scene. There is no provision made for stabilizing the output power of the laser. Examination of FIGs. 1 and 14 fail to show any feedback loop that may be used to stabilize the laser power.

Regarding claim 20, Jenkins does not teach use of the device to tune the laser to a particular wavelength. Instead, the device is used to determine the spatial mode of the reflected light. If the Examiner persists in this rejection, he is requested to point specifically to where Jenkins teaches the wavelength tuning of the laser based on the mode measurement device.

Regarding claim 21, Jenkins specifically states that the beamsplitter (38) is a 50:50 beamsplitter (col. 4, lines 7-9). Claim 21, on the other hand, is directed to the second beam, containing the interference pattern, having a power level of no more than about 10% of the power level of the light incident on the fringe-producing element.

The statement is made in the Office Action, with respect to claims 26-49, that these claims are considered as product by process steps. This is an incorrect characterization of these claims. According to MPEP § 2175.05(p), a product by process claim is a product claim that defines the claimed product in terms of the process by which it is made. Claims 26-49, on the other hand, are not product claims, but are method claims. Product-by-process rules do not apply to these claims.

Rejection under 35 U.S.C. § 103

Dependent claims 5-7, 9-15 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Vilhelmsson or Jenkins.

It is stated in the Office Action that, regarding claims 5-7, neither reference teaches the number of detector elements. It is further stated in the Office Action that discovering an optimum value of a result effective variable involves only routine skill in the art. Applicants respectfully assert that defining the invention to have at least three detector elements is not merely discovering an optimum value of a result effective variable. Further, with regard to claim 7, there is nothing in the references to teach that where there is a certain number of detector elements, n, that the spacing between the elements is set at approximately the period of the interference pattern divided by n.

Regarding claims 9-15 and 17, it is stated in the Office Action that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have different kinds of etalon, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Applicants respectfully disagree with the Examiner. The Examiner has essentially taken Official Notice that the different embodiments of etalon described in claims 9-15 and 17 are well known. Applicants respectfully request that the Examiner provide specific evidence that it was known to use all the different embodiments of etalon discussed in claims 9-15 and 17 for measuring wavelength of laser light and for applying such a measurement to wavelength stabilization.

Claims 18 and 22-25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Jenkins and Wu et al. (U.S. Patent No. 6,433,921) (Wu). Wu teaches a multiwavelength pump laser system for Raman amplifier systems.

Wu fails to rectify the deficiencies of discussed above with respect to Jenkins. In particular, Wu fails to teach a fringe-forming element disposed in the output laser beam, where the fringe-forming element causes an interference pattern in the second light beam.

Accordingly, the proposed combination of references fails to teach all the elements of the invention of independent claim 22, and claim 22 is not obvious. Claims 23-25, which depend from claim 22, and claim 18, which depends from claim 1, are, likewise, not obvious in view of the proposed combination of references.

In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Iain A. McIntyre at 952-253-4110.

Respectfully submitted,

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